

Amendment and Response

Applicant: Xiang Dai et al.

Serial No.: 10/612,663

Filed: July 2, 2003

Docket No.: 200308566-1/H300.211.101

Title: SUPPORTING A CIRCUIT PACKAGE INCLUDING A SUBSTRATE HAVING A SOLDER COLUMN ARRAY

IN THE CLAIMS

Please cancel claims 1-7 without prejudice.

Please add new claims 21-28.

Please amend claims 8-9, 13, and 15-17 as follows:

1-7. (Cancelled)

8. (Currently Amended) An electronic component system comprising:

a printed circuit board;

an integrated circuit package including a substrate having a solder column array connecting the integrated circuit package to the printed circuit board and a lid that extends outwardly over an edge of the substrate; and

a plurality of supports with one support disposed at each corner of the integrated circuit package underneath the lid of the integrated circuit package, and each support being sized and shaped to leave enable a gap between the lid of the integrated circuit package and the supports in a first assembled state of the system, and to enable contact and support between the lid of the integrated circuit package and the supports without a the gap in a second assembled state of the system.

9. (Currently Amended) The system of claim 8 wherein the second assembled state of assembly includes a static compressive load being applied to the integrated circuit package relative to the printed circuit board and the first assembled state of assembly includes the integrated circuit package and the printed circuit board not bearing a compressive load.

10. (Original) The system of claim 9 wherein the solder column array is configured to decrease in height over time in response to application of the compressive load until a substantial portion of the compressive load is shifted to the supports.

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11. (Original) The system of claim 8 wherein the support includes a body and a pair of wings extending from the body to be substantially perpendicular to each other for contacting the edges of the substrate of the integrated circuit package.

12. (Original) The system of claim 8 and further comprising:
a heat sink mounted on top of the integrated circuit package.

13. (Currently Amended) The system of claim 8 wherein each support includes a detent and the printed circuit board includes a plurality of holes shaped and sized for receiving the detent of the supports so that each support is secured to the printed circuit board upon insertion of the detent of the support into the hole of the printed circuit board.

14. (Original) The system of claim 8 wherein each support is made from at least one of a plastic material, a metal material, and a composite material, with the material having a coefficient of thermal expansion that is substantially the same as a coefficient of thermal expansion of the substrate and the solder column array.

15. (Currently Amended) An electronic component system comprising:
means for carrying circuit components;
means for performing circuit functions;
means and for electrically and mechanically connecting the means for performing circuit functions to the carrying means for carrying circuit components; and
second means for mechanically connecting supporting the circuit performing means for performing circuit functions to and the means for carrying circuit components connecting means to enable by leaving a gap between the circuit function performing means for performing circuit functions and the circuit carrying means for carrying circuit components in a first assembled state of assembly of the system, and to enable translation of by translating a compressive force from the circuit performing means for performing circuit functions to the circuit carrying means

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for carrying circuit components without the gap in a second assembled state ~~of assembly~~ of the system.

16. (Currently Amended) The system of claim 15 wherein the means for carrying circuit components comprises a printed circuit board and wherein the means for performing circuit functions and connecting to the carrying means comprises an integrated circuit package including a substrate having a solder column array connecting the circuit package to the circuit board and a lid that extends outwardly over an edge of the substrate, and the means for ~~supporting the circuit performing means and connecting means~~ comprises a plurality of supports with one support disposed at each corner of the integrated circuit package underneath the lid, and being sized and shaped to leave a gap between the lid and the support in a first state of the system, and to contact and support the lid without a gap in a second state of the system.

17. (Currently Amended) A support for a column grid array package mounted on a printed circuit board via a solder column array of the column grid array package, the column grid array package having a substrate and a lid extending outwardly over an edge of the substrate, the support comprising:

a shim sized and configured to be insertable underneath the lid of the column grid array package, configured for securing to the printed circuit board, and sized and configured to bear a substantial majority of a static compressive force applied to the column grid array package relative to the printed circuit board with the shim bearing the static compressive force only after a period of time during which the solder column array decreases in height due to creep.

18. (Original) The support of claim 17 wherein the shim comprises a main body and a pair of wing portions that extend outwardly from the main body generally perpendicular to each other.

19. (Original) The support of claim 17 wherein the shim comprises a pair of wing portions that are generally perpendicular to each other and joined together at one end to define a corner.

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20. (Original) The support of claim 17 wherein the shim comprises a body including a detent configured for insertion into a portion of the printed circuit board to secure the shim relative to the printed circuit board.

21. (New) The system of claim 8 and further comprising a fastener configured to extend through the printed circuit board and into the support while the support is in position below the lid of the integrated circuit package.

22. (New) The system of claim 8 and further comprising a single band configured to surround all of the supports to prevent lateral movement of the supports away from their position underneath the lid of the integrated circuit package.

23. (New) The system of claim 8 wherein the supports are configured to be mechanically fastened to the printed circuit board without an adhesive and configured to support the lid of the integrated circuit package in the second assembled state without an adhesive between the lid of the integrated circuit package and the support.

24. (New) The system of claim 11 and further comprising:
a fastener extending through the printed circuit board and into the main body of the supports to secure the supports to the printed circuit board.

25. (New) The system of claim 8, where in the system is a computer system.

26. (New) The system of claim 15 wherein the means for electrically and mechanically connecting the means for performing circuit functions to the means for carrying circuit components comprises a solder column array connecting the integrated circuit package to the printed circuit board, and the solder column array configured to decrease in height over time, from the first assembled state to the second assembled state, in response to application of the compressive load until a substantial portion of the compressive load is shifted to the supports.

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27. (New) The system of claim 26 wherein the second means for mechanically connecting the means for performing circuit functions to the means for carrying circuit components comprises:

a lid of the integrated circuit package that extends outwardly over an edge of the substrate; and

a plurality of supports with one support disposed at each corner of the integrated circuit package underneath the lid of the integrated circuit package, and each support sized and shaped to enable the gap between the lid of the integrated circuit package and the supports in the first assembled state of the system, and to enable contact between the lid of the integrated circuit package and the supports without the gap in the second assembled state of the system.

28. (New) An electronic component system comprising:

a printed circuit board;

an integrated circuit package including a substrate having a solder column array connecting the integrated circuit package to the printed circuit board and a lid that extends outwardly over an edge of the substrate; and

a plurality of supports with one support disposed at each corner of the integrated circuit package underneath the lid of the integrated circuit package, and being sized and shaped to leave a gap between the lid of the integrated circuit package and the supports in a first assembled state of the system, and to contact and support the lid of the integrated circuit package without the gap in a second assembled state of the system,

wherein in the first assembled state of the system, the solder column array is configured to decrease in height over time in response to application of a compressive load on the lid of the integrated circuit package until a substantial portion of the compressive load is shifted from the lid of the integrated circuit package to the supports in the second assembled state of the system.